Prince George Forest Region

Forest Resources & Practices Team

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FOREST RESEARCH NOTE

Using Sheep for Vegetation Management in Boreal White Spruce Plantations

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Sheep can significantly reduce the cover and height of competing vegetation in the year of grazing.

Introduction

Within the past ten years sheep have been used for vegetation management in the boreal forests of Ontario, Saskatchewan, Alberta, and British Columbia. Between 1992 and 1997, over 3000 ha of white spruce plantations were grazed by sheep for vegetation management in the Fort St. John and Dawson Creek Forest Districts. Sheep can be considered as an alternative to herbicides for reducing competing vegetation in white spruce plantations.

The objective of this Research Note is to summarize the information gained from operational experience with sheep grazing in the boreal forests of northeastern B.C.

Photo 1. Sheep flock in temporary corral used as night pen.

When and where to use sheep

Manual or chemical control methods are usually applied when associated vegetation is considered to be deleterious in white spruce plantations. Mortality or damage to seedlings may be less when competing vegetation is removed by grazing as opposed to brush saws or other manual techniques. Sheep grazing has a public perception as being more 'environmentally friendly' than chemical methods of vegetation control.

During the planning stage, consideration needs to be given to site conditions, the type of vegetation, site access, watercourses, breed of sheep, potential predators, shepherds, herding and guard dogs. In addition to watering areas for the flock, corrals, campsites and herd movement need to be planned so that watercourses will not be contaminated by feces or urine. For a more complete discussion of sheep grazing guidelines, the reader is referred to Newsome *et al.* (1995), and Interministry Committee for the Use of Domestic Sheep for Vegetation Management (1995).

Site selection

In the boreal forest, unsuitable sites for grazing are those with broken topography (gullies with slopes of greater than 50%), heavy slash loading (debris accumulations over 50 cm in height), and linear site preparation (ripper plow, disk trenching). On wet sites, linear site preparation creates continuous elevated areas, separated by continuous depressions which may be filled with water at times during the growing season. As sheep prefer to travel on dry ground, they will preferentially chose to walk on the elevated microsites where the trees have been planted, increasing the potential for tree damage. Similarly, sheep prefer to stand on raised microsites, such as large mounds created by site preparation, increasing the potential for damage to seedlings planted there.

Sheep management considerations

Optimum flock size was in the range of 1000 to 1500 sheep. This reflected a balance between the minimum number of sheep to graze a significant area each day, with the fixed costs of shepherds, guard dogs, herding dogs, and camp facilities.

The most effective contract was based on the price per ewe per day of grazing. This type of contract encouraged good shepherding practices and more effective treatment of the areas that were grazed. The amount of vegetative growth varied dramatically from year to year, depending on rainfall and other growing conditions. Contracts on a per ha basis encouraged shepherds to move the sheep frequently to cover more area per day and trample vegetation instead of grazing it. This shepherding technique increased the chance of seedling damage and was less effective for vegetation control.

With appropriate flock management, the sheep stayed in good condition and maintained their body weight on boreal vegetation. For more detail on flock management while grazing forest cutblocks the reader is referred to the Interministry Committee for the Use of Domestic Sheep for Vegetation Management (1995).

Photo 2. Sheep grazing cow parsnip.

Vegetation

Bluejoint (*Calamagrostis canadensis)* is often the main target species for vegetation control in white spruce plantations in the boreal forest. Other competitors include: cow parsnip (*Heracleum lanatum*), fireweed (*Epilobium angustifolium*), raspberry (*Rubus ideaus*), alder (*Alnus* spp.), willow (*Salix* spp.), rose (*Rosa acicularis*) and deciduous trees such as aspen (*Populus tremuloides*) and balsam poplar (*P. balsamifera*).

Sheep will preferentially graze the most palatable plant species available to them. If the target species is lower on the preference list, more grazing pressure is required to achieve the desired degree of vegetation control. During the growing season, palatability of some plants will change. For example, early in the growing season, the entire fireweed plant may be eaten, later in the season, only the flowers and top leaves would be browsed by sheep. Alder leaves will be eaten in May and June, but not in August. Observations in northeastern B.C. indicate the following order of preference:

High	Moderate	Low
cow parsnip	*alder (early)*	*bluejoint (mature)*
raspberry	*rose*	
fireweed (early)	*domestic grasses*	
willows	*bluejoint (early)*	
aspen & poplar		
aster		
domestic legumes		

An understanding of the seasonal growth cycle of bluejoint was critical for effective use of sheep grazing for vegetation control. Bluejoint usually begins growth in late May, completing its height growth in mid to late July. Seed heads have been formed by mid-August. Expansion into disturbed areas is often by a combination of seeding and rhizome expansion. Optimum growth of bluejoint is under full light conditions, with average or better than average moisture availability.

To control bluejoint the most effective scheduling of sheep grazing was to start as soon as sufficient vegetation had developed to support the flock without supplementary feeding (late May or early June). Target removal in the first pass was 50% of the vegetation. A second grazing pass would be made when palatable

regrowth had developed (late June to early July). Sheep would graze new bluejoint growth down until they reached stiff dry plant stalks. Target removal in the second pass was 75% of the vegetation (Figure 1). The effective grazing period was 90 days or less, concluding in early to mid-August.

Height of bluejoint was 80 - 90 cm where grazing had been excluded, and 50 cm or less where two grazing passes had occurred (Figure 2). Bluejoint can withstand heavy grazing (McLean 1979 cited in Haeussler et al. 1990). There was no evidence of reduced growth of bluejoint beyond the year of grazing on any sites where sheep had been used in northeastern B.C. Manual cutting of bluejoint two to four times during the growing season decreased yields up to 20%, while seven cuts in one growing season reduced yields

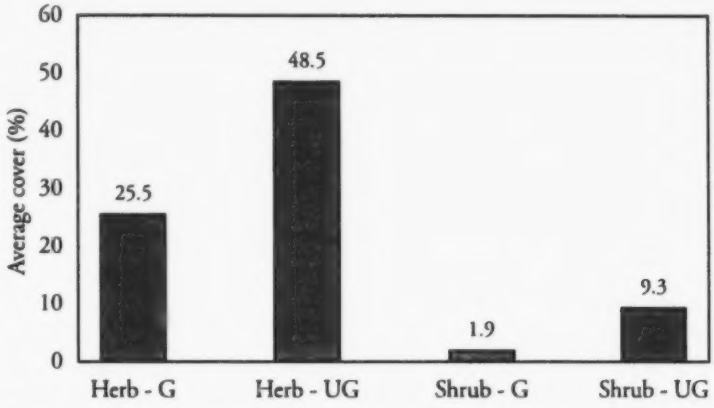

Figure 1. Average cover for herbaceous (herb) and shrub species in grazed (G) and ungrazed (UG) treatment areas after two grazing passes in 1992.

Photo 3. Plant cover on area where sheep had been excluded (August 1992).

Photo 4. Plant cover after two grazing passes by sheep (August 1992).

by 70 % (Corns and Schraa 1962 cited in Haeussler et al. 1990).

Sheep browsing on shrubs and deciduous trees may provide two or three seasons of reduced growth. The response of the shrubs and deciduous trees will depend on the severity of the browsing. Where total defoliation had occurred for several consecutive years, mortality was observed. When shrubs were taller than 1.5 m, sheep created a 'browse line', stripping the leaves and branches below this level.

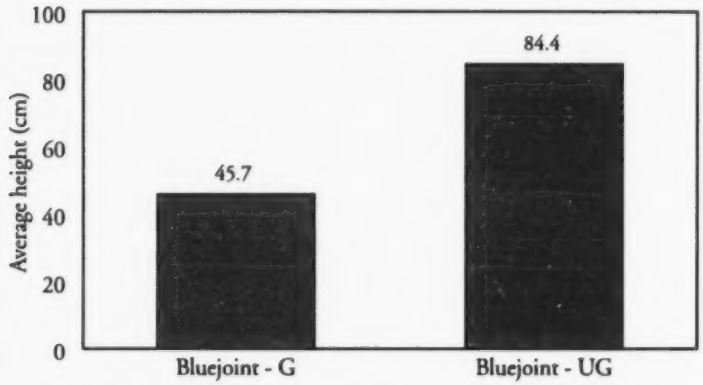

Figure 2. Average height of bluejoint in grazed (G) and ungrazed (UG) treatment areas after two grazing passes in 1992.

White spruce considerations

White spruce is very low in the order of browsing preference for sheep. Even freshly planted seedlings and seedlings which flushed as sheep grazed around them were not browsed.

Trampling and basal scarring of seedlings by sheep was accentuated by linear site preparation. Even with good shepherding practice, scarring of 5% of the spruce seedlings can be expected in each year of sheep grazing. Scars over less than 20% of the circumference of the white spruce seedling were not (by themselves) expected to result in mortality.

To provide effective vegetation control on bluejoint dominated sites, sheep grazing would usually have to be initiated within a year of planting and continue for several years. Most snowpress damage and white spruce mortality occur in the first few years after planting, as the bluejoint rapidly expands and increases in height while the spruce seedlings are relatively small. Vegetation control will be a continuing requirement until the spruce seedlings have sufficient size and stem diameter to withstand snowpress (2-3 years).

Using sheep for vegetation control in the year of planting was successful. Planting of the white spruce was done in the first two weeks of May, and grazing began in late May of that year. No damage to the white spruce was observed, even when the flushing of new growth was occurring in June.

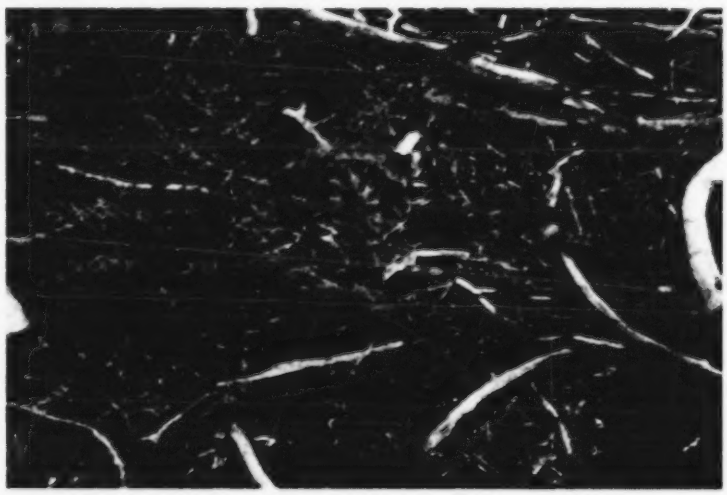

Photo 5. White spruce seedling in grazed area July 1993).

Sheep were successfully used as a site preparation treatment prior to fill planting. The area was grazed in late June, and the fill plant occurred in early July. Planting was more efficient as the original crop trees were readily observed and suitable microsites for the seedlings could be quickly chosen by the planters.

Implications for vegetation change

Sheep prefer deciduous trees and shrubs over bluejoint, particularly as bluejoint matures over the growing season. Therefore grazing pressure will be more severe on the preferred species when attempting to achieve 50 - 75 % removal of bluejoint. As a result, browse availability for ungulates is likely to be reduced for several years on sites where sheep have been used for vegetation control.

Vegetation cover was monitored on a site where sheep were used on a two pass system for three consecutive years north of Fort St. John. Three years after the last sheep grazing had occurred, the cover and height of shrubs was greater within exclosures, compared to areas where sheep had grazed. Tree and shrub species were beginning to re-establish in the grazed areas.

Photo 6. Contrast of shrub cover within exclosure compared to area with sheep grazing treatment 1992 - 1994 (September 1997 photo).

Summary

- The height and cover of competing vegetation can be reduced by using two passes of sheep over a site in one season.
- After the second grazing pass, reductions of bluejoint to less than 30% cover and 40 cm in height have been consistently achieved.
- There was no evidence of reduced growth of bluejoint beyond the year of grazing.
- Trampling and scarring of white spruce seedlings was more common where linear site preparation forced sheep to travel on the elevated microsites where seedlings were planted.
- No browsing damage to white spruce seedlings was observed, even when sheep grazing occurred a few weeks after planting.
- Cover of deciduous trees and shrubs will be reduced at least temporarily where sheep have been used for vegetation control.

References

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